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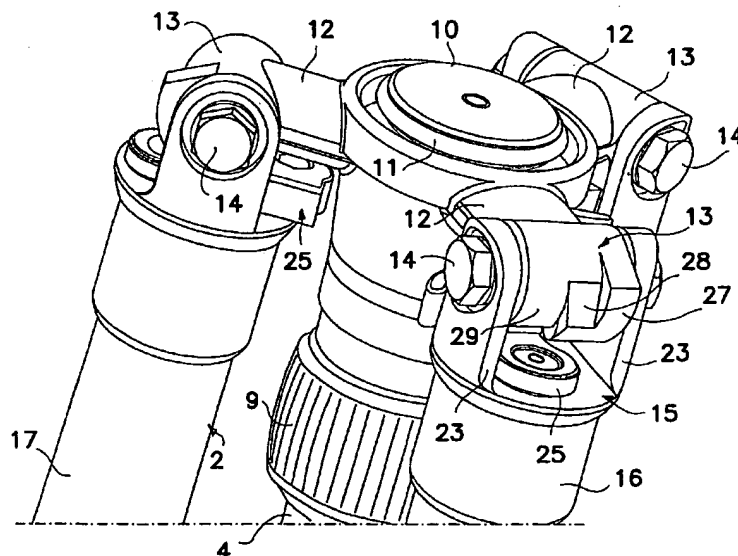
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[Continued on next page]

(54) Title: COMPACT TRIPOD



(57) Abstract: A compact tripod (1) comprises at least three legs (2) converging on a spider (3) and hinged thereto at one end by means of corresponding hinge means (13) and counter-means (15), and a support (5) for a head (6) mounted on the spider (3) in a position such that this projects from the spider opposite the legs (2) when the tripod is open in an operating position. The hinge means (13) and counter-means (15) are designed to allow the legs to be folded back from the said part of the support (5) when the tripod is closed in a non-operating position. Additionally, the hinge means (13) and counter-means (15) comprise toothed means (27, 28) and corresponding stop means (25) for the toothed means (27, 28) which are capable of interacting together to limit the extent by which the legs (2) open with respect to the spider (3).

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Compact tripodTechnical field

This invention relates to a tripod, designed particularly but not exclusively for the support of optical and/or photographic equipment, including the features mentioned in the precharacterising clause of the principal claim. In this context the term "tripod" is to be understood to indicate a support including at least three legs which converge in a spider to which the legs are hinged at one end.

Technological background

Within this specific technical field a need has been felt to provide tripods which are particularly compact when closed into a carrying position.

On the other hand it is likewise required that tripods should extend to a maximum when open in the operating position. The two requirements are obviously conflicting.

In order to reconcile the two resorts it is known to realize tripods with telescopic legs with multiple sections or threaded portions which have minimum dimensions when in the closed position. The number of threaded portions on each leg is however limited, both by technical and dimensional reasons and by reasons of an economic nature. Legs with four or five telescopic sections generally represent the normal technical limit. In order to further reduce the dimensions of tripods in the closed position, arrangements have been designed which make it possible to partly retract the head support into the spider. The further benefit which can be achieved in this way is however relatively small.

A tripod including the features of the preamble of claim 1 is described for example in US 4886230.

Summary of the invention**CONFIRMATION COPY**

The technical problem considered by this invention is that of providing a tripod which is structurally and functionally designed to overcome all the disadvantages mentioned with reference to the known art while at the same time minimising dimensions in the closed position.

5 This problem has been overcome by the invention through a tripod constructed according to the following claims.

Brief description of the drawings

The advantages and characteristics of the present invention will become clear from the following detailed description which is given with reference to the
10 appended drawings which are provided purely by way of non-limiting example and in which:

- Figure 1 is a view in elevation of a tripod according to the invention in the open operating position (with legs retracted),
- Figure 2 is an identical view of the tripod in Figure 1 in the closed non-
15 operating position,
- Figure 3 is a perspective view on a magnified scale of a detail of the tripod in Figure 2 (closed position),
- Figures 4 and 5 are perspective views of the same detail in Figure 3 in two different opening positions;
- 20 - Figure 6 is a view in axial cross-section of the tripod in the preceding figures in the closed position.

Preferred embodiments of the invention

In the figures, 1 indicates as a whole a tripod mainly but not exclusively intended for the support of optical and/or photographic equipment constructed
25 according to this invention.

Tripod 1 comprises three identical legs, all indicated by 2, converging on a spider 3 to the centre of which a column 4 is movably attached. Column 4 has a support 5 at one end for a head 6 which is in turn provided with a plate 7 on which the equipment in use can be removably fixed. Plate 7 can be orientated
5 within a substantially hemispherical space through a spherical joint which is not shown. One of the possible orientation positions is that shown in Figure 2, with the tripod closed, to which reference will be made below.

Column 4 is movably guided within a central hub 8 of spider 3 and can be immobilised in an adjustable position through tightening a collar 9. On the side
10 opposite head 6 the latter is provided with a disc-shaped stop 10 surrounded around its perimeter by a resilient elastic ring 11.

Spider 3 comprises three equally spaced arms 12 extending radially from hub 8 and each bearing a hinge sleeve 13. A fork member 15 which is shoed through a tubular length 16 onto the free end of the outermost section 17 (or
15 portion) of corresponding leg 2 is hinged on sleeve 13 through a screw pin 14. Sleeve 13 and fork member 15 constitute respectively hinge means and counter means of each leg 2 to the spider 3.

Legs 2 comprise a plurality of sections or portions 18, 19, 20 and 21 which are telescopically inserted into each other and can be extracted through
20 adjustable extension with the possibility of relative immobilisation through corresponding collar locks 22 which are functionally identical to the one on column 4.

Between the tines 23 of fork member 15 there is a flat surface 24 on which a lever 25 is hinged through a screw 26. A plurality of teeth 27, 28 which
25 are angularly offset with respect to each other and a cylindrical length 29 referred to below as the free length are provided on the outer mantle of hinge

sleeve 13. Teeth 27, 28, the free length and hinging pin 14 are coaxial with each other.

Lever 25 can be moved by means of an operating appendage 30 which is accessible from outside the tripod when in the open position, into at least three
5 operating positions in which its intermediate section bearing a shoulder 33 is positioned on the rotation trajectory of teeth 27, 28 or the free length in order to restrict the swing of legs 2 with respect to spider 3 acting as a stop for teeth 27, 28 or to permit legs 2 to rotate completely back on themselves when the aforesaid shoulder lies opposite cylindrical free length 29, against which it does
10 not abut. Lever 25 is resiliently stressed by means of a spring, which is not shown, which acts between the same and surface 24 around screw 26, towards the engaging position with tooth 27 away from free length 29.

As a result of these structural and functional arrangements tripod 1 can be closed from the open operating position in Figure 1 to a non-operating closed
15 position of minimum dimensions illustrated in Figure 2. The following actions are performed in order to change from one of these positions to the other. Starting from the open operating position in Figure 1, in order to close the tripod column 4 is raised (contrary to what would be expected) into the position of maximum extension, the portions of legs 2 are collapsed telescopically one into another,
20 the lever 25 of each leg is moved in such a way as to position it opposite free length 29 and the corresponding leg is rotated through an angle of more than 90° folding the leg to the same part of support 5 for head 6. In this position the spider and the head disappear completely between the legs of the tripod and do not therefore give rise to any additional dimensions of any kind.

25 Plate 7 is orientatable substantially at right angles with respect to the column so as to further minimise the overall dimensions in the closed position, at

the same time maximising the height of the tripod because in this way column 4 can have a longitudinal extension which is substantially identical to the extension of the legs.

The reverse operations are performed in order to open the tripod,
5 swinging the legs around the spider to bring them onto the opposite side of head 6, restricting the opening of the same by appropriately positioning of lever 25 with respect to teeth 27, 28.

Obviously the system governing the amount by which the legs of the tripod open can be wholly different from the lever and teeth system illustrated so
10 far without thereby adversely influencing the function of the invention.

The principal advantage of this tripod lies in maximising the useful height in the open operating position with a concomitant reduction in dimensions in the closed position. In addition to this the tripod is of simple construction, light, easily transportable and easily adjustable in a few operations. Not least, it makes
15 it possible to keep the head mounted on its support even when the tripod is closed, without interfering with the minimum dimensions.

CLAIMS

1. Compact tripod (1) including at least three legs (2) converging in a spider (3) to which the legs (2) are hinged at one end through corresponding hinge means (13) and counter means (15), and a support (5) for a head (6) mounted in the said spider (3) in a position such that the said support (5) projects from the said spider (3) on the side opposite the said legs (2) when the said tripod (1) is open in an operating position, and in which said hinge means (13) and counter-means (15) are designed to allow the legs (2) to be folded back from that part of the said support (5) when the said tripod (1) is closed in a non-operating position, characterized in that said hinge means (13) and counter-means (15) comprise toothed means (27,28) and corresponding stop means for the said toothed means (27,28) which are capable of interacting together to limit the extent by which the said legs (2) open with respect to the said spider (3).
2. Tripod (1) according to Claim 1 in which the said hinge means (13) and counter-means (15) are designed to permit relative rotation between the legs (2) and the spider (3) through an angle of 90° or more.
3. Tripod (1) according to Claim 2 in which the said hinge means (13) and counter-means (15) are designed to allow relative rotation between the legs (2) and spider (3) through an angle of between 90° and approximately 180°.
4. Tripod (1) according to any of the preceding claims in which the toothed means (27,28) comprise a plurality of teeth (27,28) angularly offset with respect to each other on a hinge sleeve (13) of one piece with the said spider (3) and the said stop means comprise a lever (25) with a shoulder (33) which can be moved on the leg (2) into positions such that it interferes

selectively abutting against one of the said teeth (27,28) to limit the angle through which the said leg opens.

5. Tripod (1) according to Claim 4 in which the said teeth (27,28) are positioned on projections coaxial with the said sleeve (13).
- 5 6. Tripod (1) according to Claim 4 or 5 in which a free length (29) is provided on the said sleeve (13) which does not interfere with the said stop means so that when the said stop means are positioned on the said free length (29) the said legs (2) can be folded back between the operating position and the non-operating position.
- 10 7. Tripod (1) according to one or more of claims 4-6 in which the said lever (25) is provided with an operating appendage (30) which is accessible from the side opposite the spider (3) when the legs (2) are in the operating position.
8. Tripod (1) according to one or more of claims 4-7 in which the lever (25) is resiliently stressed towards a position in which it engages with a tooth (27)
15 distance from the said free length (29).
9. Tripod (1) according to one or more of the preceding claims in which the said support (5) is mounted on a column (4) which is movably engaged in the said spider (3) in an adjustable manner.
10. Tripod (1) according to claim 9 in which said head (6) fitted to the said
20 support (5) is provided with a plate (7) which can be orientated substantially at right angles with respect to the axis of the column (4) when the tripod (1) is closed in the non-operating position.

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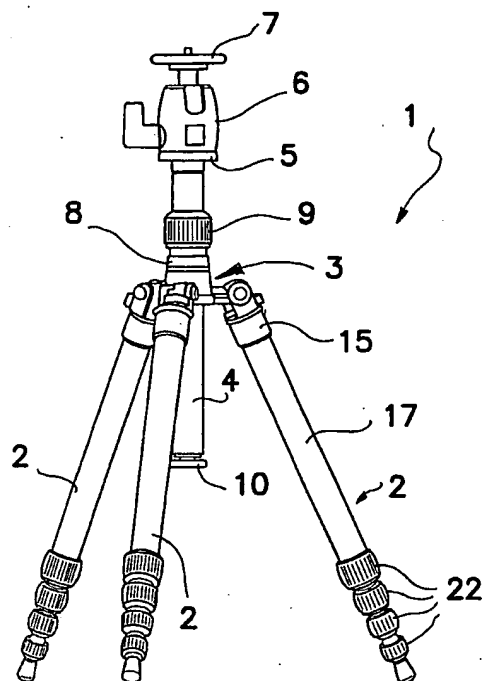


Fig. 1

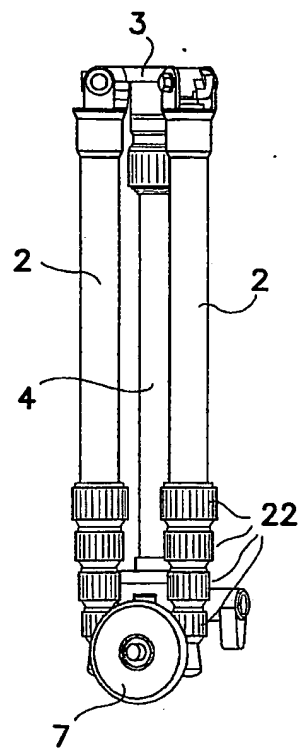


Fig. 2

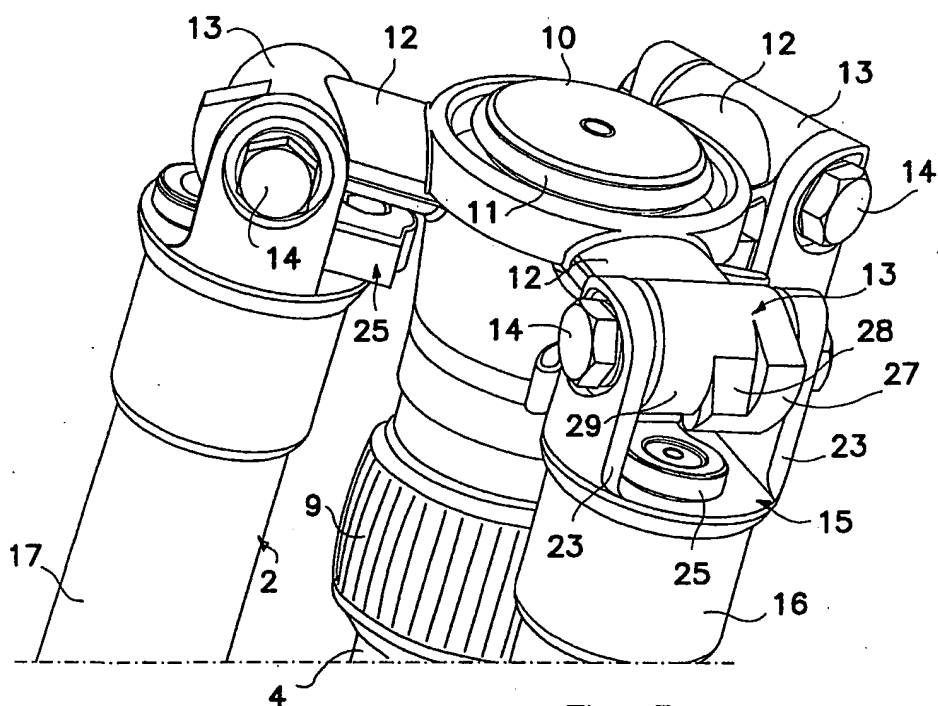


Fig. 3

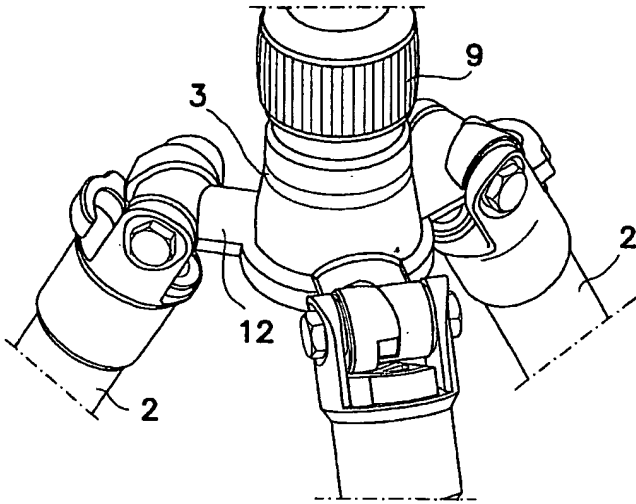


Fig. 4

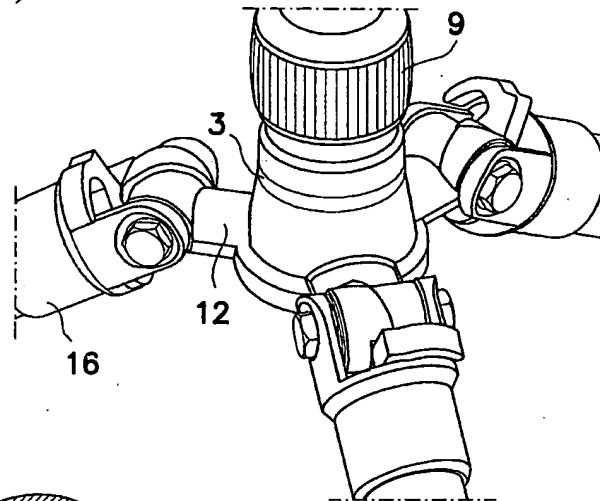


Fig. 5

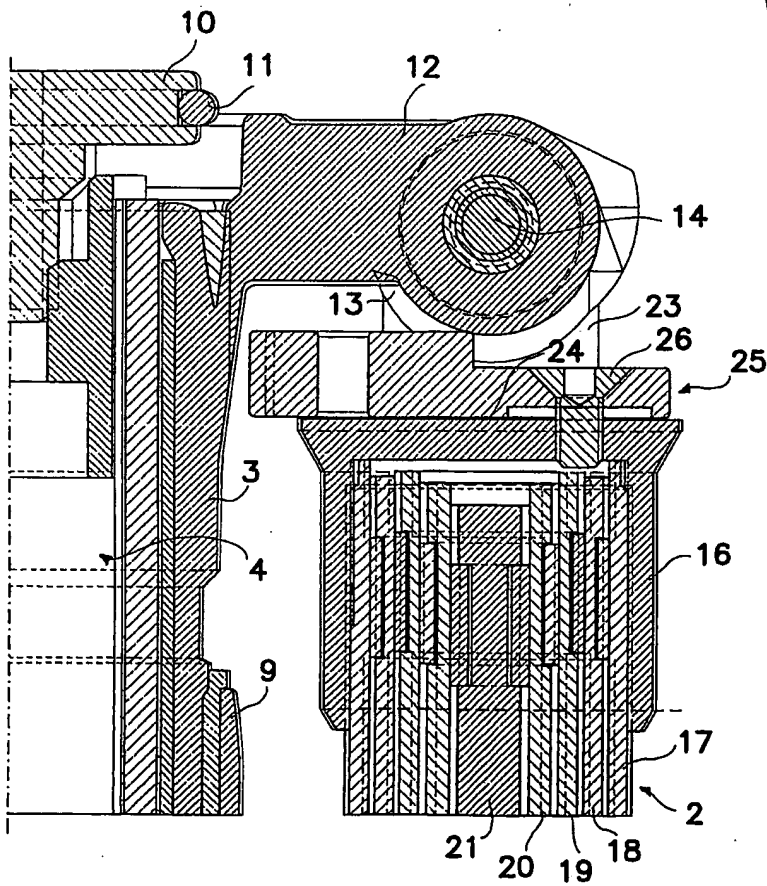


Fig. 6

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F16M11/32 F16M11/16

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B. FIELDS SEARCHED

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IPC 7 F16M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 310 145 A (CHEN JASON) 10 May 1994 (1994-05-10) the whole document	1-3
Y	-----	4,5,7,9
Y	FR 2 205 983 A (PFLIEGER ROGER) 31 May 1974 (1974-05-31) the whole document	4,5,7,9
X	US 5 082 221 A (LAI SHIH-WANG) 21 January 1992 (1992-01-21) column 2, line 3 - line 65; figures 1-7	1-3
A	US 4 886 230 A (JONES JOHN A ET AL) 12 December 1989 (1989-12-12) cited in the application column 7, line 25 - line 32; figures 1-5 ----- -/--	1-3,10

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F16M

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98/56538 A (TRITON TECHNOLOGIES PTY LTD ; SZOMMER HARRY (AU); BROWN WARREN (AU); L) 17 December 1998 (1998-12-17) page 7, line 23 - line 26; figure 1 -----	1,9,10
A	CH 325 873 A (TECOZ GEORGES) 30 November 1957 (1957-11-30) the whole document -----	1-3
A	FR 2 203 486 A (PFLIEGER ROGER) 10 May 1974 (1974-05-10) the whole document -----	1,2,5
A	EP 0 952 383 A (MANFROTTO LINO & C SPA) 27 October 1999 (1999-10-27) column 2, line 10 - line 15; figures 1,2,6,7 -----	1,9
A	US 1 803 534 A (VOLDEMAR LEEVO) 5 May 1931 (1931-05-05) page 1, line 51 - line 81; figures 1,2 -----	1,10
A	US 2 548 659 A (EPPRECHT ALFRED G) 10 April 1951 (1951-04-10) column 1, line 39 - line 43; figure 2 -----	1,10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP2005/000022

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5310145	A	10-05-1994	CN 2174630 Y	17-08-1994
FR 2205983	A	31-05-1974	FR 2205983 A6	31-05-1974
US 5082221	A	21-01-1992	NONE	
US 4886230	A	12-12-1989	AU 8326787 A	01-06-1988
			EP 0288552 A1	02-11-1988
			JP 1501243 T	27-04-1989
			WO 8803631 A1	19-05-1988
WO 9856538	A	17-12-1998	AU 8003698 A	30-12-1998
			WO 9856538 A1	17-12-1998
CH 325873	A	30-11-1957	NONE	
FR 2203486	A	10-05-1974	FR 2203486 A5	10-05-1974
			DE 2256125 A1	25-04-1974
			DE 7242098 U	14-04-1977
EP 0952383	A	27-10-1999	IT PD980096 A1	25-10-1999
			CN 1232935 A ,C	27-10-1999
			DE 69804761 D1	16-05-2002
			DE 69804761 T2	28-11-2002
			EP 0952383 A2	27-10-1999
			JP 11311398 A	09-11-1999
			US 6164843 A	26-12-2000
US 1803534	A	05-05-1931	NONE	
US 2548659	A	10-04-1951	DE 730340 C	11-01-1943